CLAIMS

We claim:

1. A drive mechanism for a power tool, the power tool including a motor including a drive shaft and an output member adapted to support a tool element, the drive mechanism comprising:

a drive assembly engaged with and driven by the drive shaft; and

a drive arm drivingly connected between the drive assembly and the output member to transmit driving force from the drive assembly to the output member, the drive arm being configured to absorb an impact.

2. The drive mechanism as set forth in Claim 1, wherein the drive assembly includes a gear rotatably driven about an axis by the drive shaft and drivingly connected to the drive arm.

3. The drive mechanism as set forth in Claim 2, wherein the drive assembly includes a drive member supported by the gear and offset from the axis, the drive member being connected to the drive arm to drivingly connect the gear to the drive arm.

4. The drive mechanism as set forth in Claim 2, wherein the drive arm connects the gear to the output member to convert rotation of the gear to reciprocation of the output member.

5. The drive mechanism as set forth in Claim 2, wherein the drive assembly further includes

a hub selectively driven by the gear, the hub rotatable about the axis relative to the gear, and

an elastic member positioned between the gear and the hub to absorb the impact.

6. The drive mechanism set forth in Claim 1, wherein the drive arm has a first portion and a second portion, one of the first portion and the second portion being a flexible portion.

7. The drive mechanism set forth in Claim 6, wherein the flexible portion is configured to absorb the impact.

8. The drive mechanism set forth in Claim 7, wherein the flexible portion includes a flexible member.

9. The drive mechanism set forth in Claim 8, wherein the flexible member is connected to the other of the first portion and the second portion.

10. The drive mechanism set forth in Claim 8, wherein the flexible member is formed of a different material than the other of the first portion and the second portion.

11. The drive mechanism set forth in Claim 10, wherein the flexible member is formed of an elastomeric material.

12. The drive mechanism set forth in Claim 10, wherein the flexible member is formed of rubber.

13. The drive mechanism set forth in Claim 8, wherein the drive arm further includes a third portion, and wherein the flexible member is located between the third portion and the other of the first portion and the second portion.

14. The drive mechanism set forth in Claim 13, wherein the third portion and the other of the first portion and the second portion are interlocked to limit the amount of deflection generated in the drive arm.

15. The drive mechanism set forth in Claim 14, wherein the other of the first portion and the second portion is connected to the drive assembly, and wherein the third portion is connected to the output member.

16. The drive mechanism set forth in Claim 6, wherein the flexible portion has a flexure point to create an area of deformation to absorb the impact.

17. The drive mechanism set forth in Claim 16, wherein the flexure point is provided by a cut-out area.

18. The drive mechanism as set forth in Claim 1, wherein the power tool is a reciprocating saw, wherein the output member is a reciprocatable spindle, wherein the tool element is a saw blade operable to cut a workpiece, and wherein the drive arm absorbs an impact resulting from a blade lock-up.

19. A reciprocating saw comprising:

a housing;

a motor supported by the housing and having a drive shaft;

a spindle supported by the housing and adapted to support a saw blade; and

a drive mechanism supported by the housing and operable to drive the spindle, the drive mechanism including

a drive assembly engaged with and driven by the drive shaft, and

a drive arm drivingly connected between the drive assembly and the spindle to transmit driving force from the drive assembly to the spindle, the drive arm being configured to absorb an impact.

20. A drive mechanism for a power tool, the power tool including a motor including a drive shaft and an output member adapted to support a tool element, the drive mechanism comprising:

a gear driven by the drive shaft for rotation about an axis;

a hub selectively driven by the gear for rotation about the axis, the hub being movable relative to the gear, the hub including a drive member offset from the axis and connected to the output member to drivingly connect the hub to the output member;

a drive arm connecting the drive member to the output member to convert rotation of the hub to reciprocation of the output member; and

structure positioned between the gear and the hub, the structure selectively transmitting drive force from the gear to the hub and selectively allowing relative movement between the gear and the hub.

21. The drive mechanism as set forth in Claim 20, wherein the drive shaft supports a pinion, and wherein the gear has an outer periphery defining teeth, the teeth being engaged with and driven by the pinion to rotate the gear about the axis.

22. The drive mechanism as set forth in Claim 20, wherein the hub is rotatable about the axis relative to the gear.

23. The drive mechanism as set forth in Claim 20, wherein the structure includes an elastic member.

24. The drive mechanism as set forth in Claim 23, wherein the gear defines a pocket and includes a gear protrusion in the pocket, and wherein a portion of the hub is supported in the pocket and includes a hub protrusion, the gear protrusion drivingly engaging the hub protrusion.

25. The drive mechanism as set forth in Claim 24, wherein at least a portion of the elastic member is positioned between the gear protrusion and the hub protrusion.

26. The drive mechanism as set forth in Claim 25, wherein the gear protrusion includes a first side and a second side, wherein the hub protrusion includes a first side and a second side, and wherein the elastic member includes a first elastic member protrusion positioned between the gear protrusion first side and the hub protrusion first side and a second elastic member protrusion positioned between the gear protrusion second side and the hub protrusion second side.

27. The drive mechanism as set forth in Claim 24, wherein the gear includes a plurality of gear protrusions, and wherein the hub includes a plurality of hub protrusions.

28. The drive mechanism as set forth in Claim 27, wherein the elastic member includes a plurality of elastic member protrusions, each one of the plurality of elastic member protrusions being positioned between an adjacent one of the plurality of gear protrusions and of the plurality of hub protrusions.

29. The drive mechanism as set forth in Claim 28, wherein the elastic member includes a body, and wherein the plurality of elastic member protrusions are connected to the body.

30. The drive mechanism as set forth in Claim 28, wherein the gear includes four gear protrusions, wherein the hub includes four hub protrusions, and wherein the elastic member includes eight elastic member protrusions.

31. The drive mechanism as set forth in Claim 23, wherein the elastic member is formed of rubber.

32. The drive mechanism as set forth in Claim 23, wherein the elastic member is formed of an elastomeric material.

33. The drive mechanism as set forth in Claim 20, wherein the power tool is a reciprocating saw, wherein the output member is a reciprocatable spindle, wherein the tool element is a saw blade operable to cut a workpiece, and wherein the structure absorbs impact resulting from a blade lock-up.

34. The drive mechanism as set forth in Claim 20, wherein the structure is a slip clutch.

35. The drive mechanism as set forth in Claim 34, wherein the slip clutch includes a plurality of clutch disks, and wherein two of the clutch disks are driven by the gear and another of the clutch disks is driven by the hub and is sandwiched between the clutch disks that are driven by the gear.

36. A power tool comprising:

a housing;

a motor supported by the housing and having a drive shaft;

an output member supported by the housing and adapted to support a tool element; and

a drive mechanism supported by the housing and operable to drive the output member, the drive mechanism including

a gear driven by the drive shaft for rotation about an axis,

a hub selectively driven by the gear for rotation about the axis, the hub being movable relative to the gear, and

structure positioned between the gear and the hub, the structure selectively transmitting drive force from the gear to the hub and selectively allowing relative movement between the gear and the hub.

37. The power tool as set forth in Claim 36, wherein the structure includes an elastic member.

38. The power tool as set forth in Claim 36, wherein the gear defines a pocket and includes a gear protrusion in the pocket, and wherein a portion of the hub is supported in the pocket and includes a hub protrusion, the gear protrusion drivingly engaging the hub protrusion, and wherein at least a portion of the elastic member is positioned between the gear protrusion and the hub protrusion.

39. A reciprocating saw comprising:

a housing;

a motor supported by the housing and having a drive shaft;

a spindle supported by the housing and adapted to support a saw blade; and

a drive mechanism supported by the housing and operable to drive the spindle, the drive mechanism including

a gear driven by the drive shaft for rotation about an axis,

a hub selectively driven by the gear for rotation about the axis, the hub being movable relative to the gear, and

structure to absorb impact positioned between the gear and the hub, the structure selectively transmitting drive force from the gear to the hub and allowing relative movement between the gear and the hub to absorb an impact on the spindle.

40. The reciprocating saw as set forth in Claim 39, wherein the structure is an elastic member.

41. The reciprocating saw as set forth in Claim 40, wherein the gear defines a pocket and includes a gear protrusion in the pocket, wherein a portion of the hub is supported in the pocket and includes a hub protrusion, the gear protrusion drivingly engaging the hub protrusion, and wherein at least a portion of the elastic member is positioned between the gear protrusion and the hub protrusion.

42. A reciprocating saw comprising:

a housing;

a motor supported by the housing and having a drive shaft;

a spindle supported by the housing and adapted to support a saw blade; and

a drive mechanism supported by the housing and operable to drive the spindle, the drive mechanism including

a gear driven by the drive shaft for rotation about an axis

a hub selectively driven by the gear for rotation about the axis, the hub being movable relative to the gear,

a drive member connected to the hub offset from the axis and connected to the spindle to drivingly connect the hub to the spindle,

a drive arm connecting the drive member to the spindle to convert rotation of the hub to reciprocation of the spindle, and

a slip clutch positioned between the gear and the hub, the slip clutch selectively transmitting drive force from the gear to the hub and allowing relative movement between the gear and the hub to absorb and impact on the spindle.

43. The reciprocating saw as set forth in Claim 42, wherein the slip clutch includes a plurality of clutch disks, and wherein two of the clutch disks are driven by the gear and another of the clutch disks is driven by the hub and is sandwiched between the clutch disks that are driven by the gear.